D 1.3/2:7/1

DEFENSE INDUSTRY BULLETIN

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

WINTER 1971

THE PARTHENON

Classic Example of Configuration Management

UNIV. OF FLORIDA LIBS.
DOCUMENTS
DEPARTMENT
U.S. DEPOSITORY

UNIVERSITY OF FLORIDA LIBRARIES
JAN 1971
DOCUMENTS DEPT.

UNIVERSITY OF FLORIDA LIBRARIES
JAN 1971
DOCUMENTS DEPT.

DEFENSE INDUSTRY BULLETIN

Vol. 7 No. 1 Winter 1971

Published for Department of Defense
by Defense Supply Agency

HON. MELVIN R. LAIRD
SECRETARY OF DEFENSE

LT. GEN. EARL C. HEDLUND, USAF
DIRECTOR, DEFENSE SUPPLY AGENCY

EUGENE F. HART
SPECIAL ASSISTANT, PUBLIC AFFAIRS

ACTING EDITOR
CAPT. FRANK W. KAFER, USAF

EXECUTIVE EDITOR
MRS. CECILIA POLLOK McCORMICK

EDITORIAL, CIRCULATION ASSISTANT
SN MICHAEL T. HOUGHTON, USN

The *Defense Industry Bulletin* is published quarterly by the Defense Supply Agency for the Department of Defense. Use of funds approved by the Director, Office of Management and Budget, Oct. 14, 1970.

The *Bulletin* serves as a means of communication between the Department of Defense, its authorized agencies, defense contractors and other business interests. It provides guidance to industry concerning official DOD policies, programs and projects and seeks to stimulate thought on the part of the Defense-Industry team in solving problems allied to the defense effort.

Suggestions from industry representatives concerning possible topics for future issues are welcome and should be forwarded to the Editor at the address shown below.

The *Bulletin* is distributed free of charge to qualified representatives of industry and of the Departments of Defense, Army, Navy, and Air Force. Subscription requests should be submitted on company letterhead, must indicate the title of the requester, and be addressed to: Editor, Defense Industry Bulletin, Hq., Defense Supply Agency, Alexandria, Va. 22314.

Contents of this magazine may be freely reprinted. Mention of the source will be appreciated.

IN THIS ISSUE

1 Configuration Management: Creative Catalyst?
Chester P. Buckland

4 PROMAP 70: System Engineering Process
E. Oakley Drumheller Jr.
Forrest L. Godden Jr.
John F. Schwegler

10 Partnership in Disaster Preparedness
John E. Davis

12 Army Inertial Guidance Management and Technology Center: Focal Point of Inertial Research and Development
Dr. John L. McDaniel

15 Security Education and Training: Preventive Against Compromise
James A. Reeder

19 Source Selection Scheme for Scout System
Marvin Rich

Configuration Management: Creative Catalyst?

Chester P. Buckland

Configuration management has the dubious distinction of being the number one damper of ambition in talented youth. In both industry and Government, an assignment to that field may be greeted with all the enthusiasm of exile to Siberia.

Come to think of it, perhaps such assignments are a good way to identify young men who *are* talented and ambitious. If, after a few months of configuration management, they seem restless and dissatisfied, top management in both Government and industry may have some budding executives on its payroll. They may be cut out for something more challenging to creative spirits.

Consider for a moment. Configuration management does not visibly create anything except paperwork; it merely provides a decision framework. By a set of baselines, established at prescribed times, it tells creative people that decisions have been made. A set of rigid controls prescribe that creative engineers may decide to create something different, only when the baseline decision has been formally changed. Finally, an encyclopedic set of records must be maintained showing that carefully deliberated decisions have been rigorously followed. The entire process, from conception to deployment, is meticulously documented. As a bold new project reaches fulfillment, the configuration specialist may feel that he has contributed nothing but the inevitable mountain of paper. Surely, promotions won't spring from that!

But let's take another look. Suppose there were no configuration management. Suppose automobile manufacturers maintained no parts lists by yearly models and body styles. Suppose this were also true of refrigerators, washing machines and televisions. One of two things would happen. Either there would be no yearly models, or design changes would make routine repairs prohibitively expensive. The economics of mass production would maintain a collision course with advancing technology. Catastrophe is averted by implementing documented design decisions which permit mass production and technical progress to occur simultaneously. Manufacturers' parts lists are mute, but tangible, witnesses to an industrial matrimony at which configuration managers performed the rites.

Viewed in this light, configuration management emerges as a catalyst which amalgamates mass production and engineering advances. These partners are the very heart and soul of our "affluent society." But, like all catalysts, configuration management leaves no trace in the finished product. Its achievements reside in such prosaic documents as grease-smudged parts lists, dusty specifications, and faded blueprints. These unsung monuments proclaim many hours of soul searching deliberations whereby key decisions were announced.

Hence, these are the frustrations of talented and creative young minds who toiled through the catalytic process. Their sense of unfulfillment is in some sort of direct proportion to the sophistication of an end product.

Chester P. Buckland is a research associate with Ohio State University and an instructor in the Defense Cost and Price Analysis course. At the time this article was written he was instructor in configuration management under an Ohio State University contract with the Defense Weapon System Management Center, Wright-Patterson AFB, Ohio. A retired Air Force officer, he served as Chief of Production, 412L SPO, and Chief of Procurement, 438L SPO, Electronics Systems Division, AFSC, Hanscom Field, Mass. He holds a bachelors degree in economics and a masters degree in business administration from Harvard University.

When a space vehicle is successfully launched, and performs some incredible mission, the headlines lavish praise on the scientists, the engineers, and the production wizards responsible. The configuration managers are only acknowledged, if at all, in some omnibus phrase as "the humble rank and file who labored incessantly to make this feat a success."

"Big Deal!" thinks the talented youth and lays plans for a changed assignment. The program manager's problems are thereby compounded by questions of human motivation.

As spectacular new systems become operational, the front page headlines disappear. Occasional press releases may refer to "tactical successes." They never mention the engineering change decisions that were required to make those successes possible. Specialized journals, which the public never sees, may contain glowing accounts of "operational readiness rates," "reliability," or better-than-expected "life-cycle costs." There is never a mention of the continued catalytic action which is indispensable, and inseparable, from these logistic phenomena. Dispatches from the front are never written by configuration managers.

Decision-Making Role

So, what does all this mean; and why is this article being written? It is being written to suggest possible ways to raise configuration management above the status of anonymous drudgery. One method is implicit in what has already been said. It should be relatively easy to dramatize the decision-making role that configuration managers play to allow mass production and technical progress to coexist. But first we must set the stage.

Automobile manufacturers bring out yearly models for several reasons. First, the practice helps to maintain a high sales volume by appealing to a widespread desire to own the latest model. Second, in many cases a year's production roughly matches the useful life of a set of production tools, the foundation of mass production. Since tooling must be replaced, new styles are economically justified to satisfy the demand for distinction. Finally, the tooling life cycle is the logical time to incorporate new and improved designs, including technical advances.

Yearly models do not involve all parts of a car. Except for body styles, a major portion may remain unchanged for many years. Internal mechanical improvements may wait upon the exigencies of competition or public clamor. Heavy costs of new tool designs are, thus, avoided where they won't show. Hence, a given car may sport the latest garb but harbor components from many prior years. The inevitable result is a necessity for parts lists, that massive body of documentation which records the configuration of any given car. This is status accounting in its most prosaic form; the unsung product of configuration management.

Now for a simple test of its importance. Let the frustrated or skeptical young configuration manager assume that he has lost the gas tank cap on his car. Let him then go to the nearest well stocked service station and ask for a replacement. The attendant will ask for the car's year and model. With this information, the chances are excellent that with his parts list, showing the manufacturer's identifying number, a replacement cap will be readily found in the dealer's stock costing less than $2.50. Configuration status accounting has made the replacement a relatively quick and economical process. Mass production provided the economy, and advanced technology provided the latest design (perhaps even later than the original item).

Application to Military Items

Now let the tyro executive, the young configuration manager in this case, transfer his thinking to military items. In this field, "style" has no place, but advanced technology is all important. Military threats are not static. The stark facts of survival compel immediate response to improved enemy capability. Furthermore, technically improved weapons, which increase an existing margin of superiority, tend to keep an enemy off balance. Hence, the importance of simultaneous mass production and engineering advance. Hence, the paramount importance of configuration management's catalytic action which makes the simultaneous actions possible. As ambitious young men grasp this idea, frustration wanes. The reasons for configuration baselines, continuously identified by disciplined procedures, begin to emerge. MIL–S–83490 and MIL–STD–490 assume new vitality.

The gestation of improved weapons is a pageant of changes. The item ultimately delivered can be no sounder than the decisions made by the attending physician in his application of configuration control. Injudicious decisions, which violate the criteria of MIL–STDs–480 and 481, will be memorialized by birth defects of operational shortcomings. Clearly, the decision-making contribution of configuration managers are not to be lightly ignored, Their genetic messages demand respect.

Through the infancy of system test, the adolesence of initial training, and the maturity of operational deployment, a system is logistically nourished. Initial sustenance may flow through the mammary glands of contracts for augmented contractor support. In other cases, the catalytic action of configuration management produces initial support whereby all inherited and modified features of a system, produced by mass production, are reconciled. In short, initial spares are accurately representative of the delivered item. By continued application of configuration management, the anatomy of a weapon system is adapted to changing requirements. The logistic diet is judiciously prescribed by the "Data Elements and Related Features" of configuration status accounting. By MIL–STD–882, a wholesome interface is maintained between mass production industry and DOD's changing world. By adroit (but sometimes tedious) application, a truly remarkable union is effected.

If the union prospers, its praises flow. The headlines proclaim operational achievements. The journals disgorge statistical reports. Program managers get promoted. Configuration managers remain anonymous, and continue to generate mountains of documents. Only rarely can they see over the top, and behold the outcome of their labor. They remain unmotivated, because no one has thought to dramatize their contribution. The program manager, who struggles to retain talent at the inception of a program, may consider filling this void by enlightened indoctrination: *Extol the importance of catalysts!*

Consider the Parthenon

As this approach wears thin with the passage of time, another suggestion is offered. It draws upon history.

Other ages have had their notions of progress, and their ideas of "breakthroughs" in achieving it. In the Age of Pericles, 500 to 400 B.C., progress was measured by the development and perfection of new forms of artistic expression. Sculpture had started in Egypt as mere bas reliefs. It took centuries to learn how to carve statues "in the round," *i.e.*, unsupported by a wall, cliff, or other adjacent element. Even then, statues were often held upright by serving as columns for temple roofs. The Cretans went a little farther. They managed some statues that stood alone, but arms, legs, and inanimate objects had to be close to the subject. A warrior with sword outstretched was beyond the "state of the art." The Greeks gave us the first truly great examples of "free-standing" statues. In their eyes, such masterpieces as "The Discus Thrower" were incredible achievements.

Their efforts were by no means limited to sculpture. Research and development were lavished on drama, poetry, and architecture. In the latter field, the Parthenon was probably their most spectacular achievement. Even in its present nearly ruined state, it commands our genuine admiration. Its construction incorporated, in one edifice, not only free-standing statues by the great Phidias, it contained dozens of them; and they were all masterpieces.

If you have visited the Parthenon, or read about it, you know that there is not a straight, a vertical, nor a horizontal line in it. The steps across the front and rear are 110 feet long, but they are four inches higher in the center than at either end. The columns are neither straight nor vertical. They slope from each end of a colonnade toward the center. The sides are slightly curved, and taper toward the capitols. All of the other seemingly straight, vertical, or horizontal lines are similarly curved, ever so slightly.

Why? Because the architects, Callicrates and Ictinus, had learned by experience that straight lines, in a building of that size, produced an effect on the eye that was cold, harsh, and severe. They knew that the use of imperceptible curves produced an effect that was soft and aesthetically pleasing. The resulting temple was an artistic breakthrough of breakthroughs. It was as exciting to the Greeks of Pericles' day as a manned moon landing is to us.

But think of the tedious amount of detailed work—of configuration management—that must have been necessary to bring this about. Think of the "paper work" that was needed to tell each stonecutter and each mason *exactly* how to cut and assemble each massive piece of marble, so that the desired effect would, in fact, be achieved. The ambitious young men who handled the details must have had their moments of boredom and frustration, but the end result must have been inwardly rewarding. The verdict of history has been that their efforts were well worthwhile.

It really doesn't matter whether the end result of a long, difficult, and tedious task is a Greek temple, space vehicle, or something in between. If the resulting product represents progress, artistic or scientific, it must also represent exact and extensive planning. There can be no significant progress without it. This thought may come as a revelation and stimulating idea to unsung configuration managers. Perhaps they will see for the first time that they are not building mountains of documentation; they are assisting at the birth of a major achievement.

System Engineering Process

E. Oakley Drumheller Jr.
Forrest L. Godden Jr.
John F. Schwegler

In October 1969, Headquarters, Army Materiel Command (AMC), prepared its "Program for the Refinement of the Materiel Aquisition Process" (PROMAP–70). This acquisition process-oriented plan was designed to effect improvements in the area of weapon system acquisition for the Army. (See article "PROMAP–70" by Major General Paul A. Feyereisen, USA, *Defense Industry Bulletin*, August 1970, page 18.)

As one of the tasks of PROMAP–70, the Army Management Engineering Training Agency (AMETA), Rock Island, Ill., developed a two-week course for instructing Army personnel in the technique and management of system engineering. The course is presently being conducted at AMETA with a class mix of personnel from AMC major subordinate commands and from program management offices to provide a varied viewpoint of operations and backgrounds. This classroom mix has indicated a practical beginning to system engineering and cross-command communications.

The term "system engineering," often heard by government and contractor personnel, can be defined as the selected application of scientific and engineering efforts to:

- Transform an operational need into a description of system performance parameters and a system configuration through the use of an iterative process of definition, synthesis, analysis, design, test and evaluation.
- Integrate related technical parameters and assure compatibility of all physical, functional, and program interfaces in a manner which optimizes total system definition and design.
- Integrate reliability, maintainability, safety, survivability, human factors, and other specialties into the total engineering effort.

The functional work of system application is accomplished through engineering, or the "how" of the system engineering process. This process can be thought of as sequential and iterative methodology involving top-down development of the product and technical program task elements of the work breakdown structure. It involves allocation of design requirements and technical program definitions to all system and technical program elements, including those for technical performance management. More simply stated, the process converts user input requirements into a description of the optimal combination of system elements that satisfy the need.

Since system engineering is considered as selected application of scientific and engineering efforts, system engineering management is being strongly implied. Management involves planning and controlling of a totally integrated engineering effort related to a system program. Included is the requirement to define the system, as well as the integrated planning and control of the program elements of design engineering, integrated logistic support, production engineering, and test and evaluation engineering.

To better understand the technique or methodology of system engineering, let us now examine the system engineering process in more detail. For purposes of discussion, the steps of function analysis, synthesis, evaluation and decision, and system description are separated. In actual application, however, these steps are interacting and interdependent (Figure 1).

Function Analysis

After verification of the adequacy of input information, function analysis is performed to establish a baseline of functions and function performance requirements which must be met to adequately accomplish the operation, maintenance, test, production and deployment requirements of the system. These functions and their performance requirements provide a common denominator of selection and design criteria for the system elements. Function analysis actually consists of the three interrelated subactivities of function identification, function performance requirements analysis, and time requirements analysis.

Function identification is analysis of system objectives to identify functions that must be performed to satisfy the objectives of each functional cycle. Functions are indentured from the top down so that subfunctions are recognized as a part of higher order functions. They are also arranged in their logical sequence so that any specified operational use of the system can be traced in an end-to-end or closed-loop path. At any level, however, the function(s) must be stated in action-oriented terminology and not in terms of its synthesized solution. A successful practice of value engineers, equally appropriate here, is to limit function identification to two words—a verb and a noun. Such practice avoids mixing functions with requirements or solutions. For example, *transfer fuel* is strictly function oriented, whereas *provide a fuel pump* presupposes a partial solution to accomplishing the action.

Once functions have been identified performance requirements must be developed for each function. These requirements define the input and out-

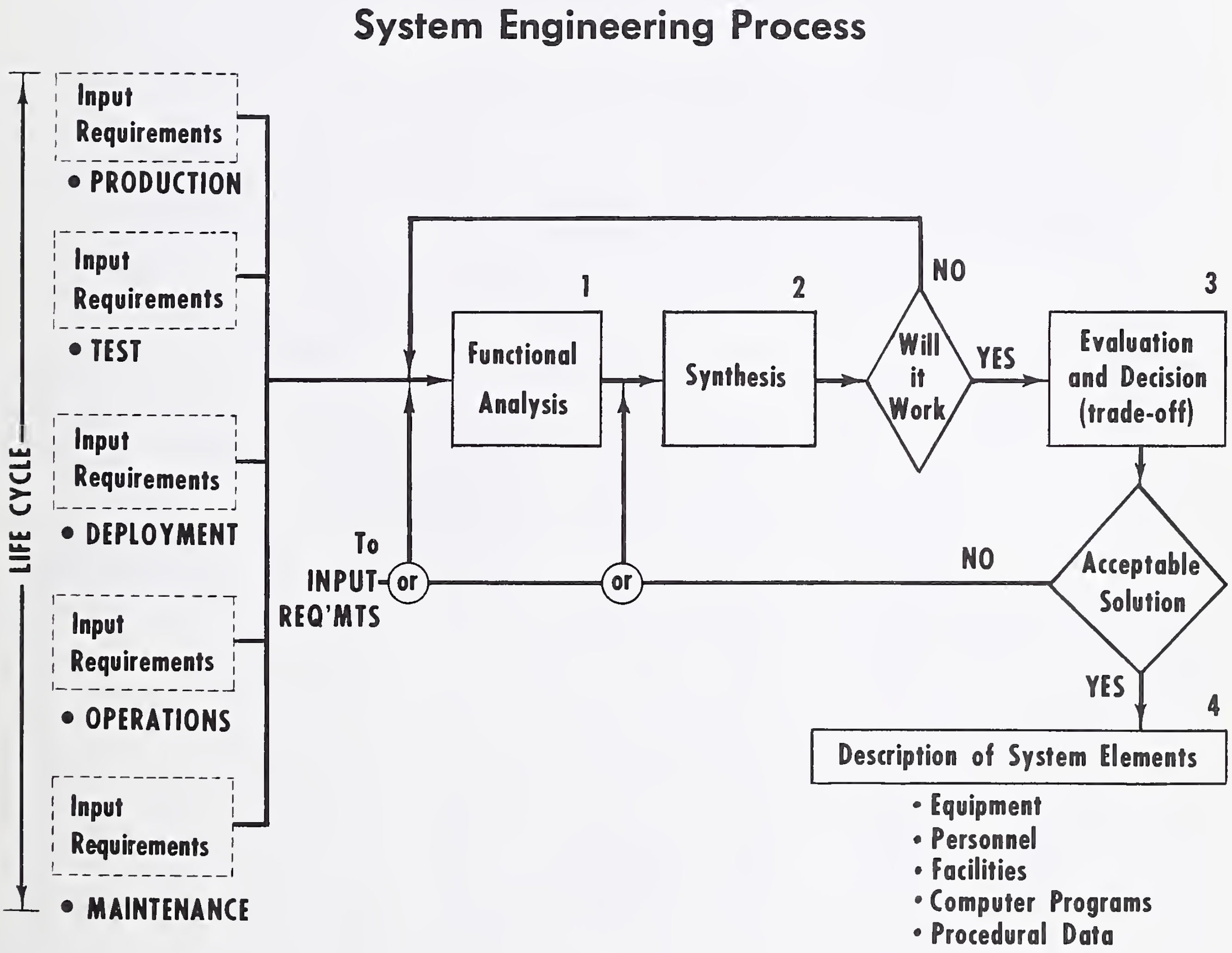

System Engineering Process

Figure 1.

The system engineering process begins with the receipt of input requirements. It is a sequential and iterative process consisting of function analysis, synthesis, evaluation and tradeoff decisions and, ultimately, results in a description of system elements in the form of design to requirements and criteria.

put functions in sufficient detail for direct use as criteria for equipment design and operation, personnel skill development, facility operation, computer programming, display of procedural instructions/data, and logistic support. They must also be traceable to the analysis by which they were derived and to the higher order of functions. In allocating requirements to lower functions and subsequent equipment design, activities performing function requirements analysis should effect integration and optimization to achieve completeness and compatibility in all engineering efforts.

Time requirements analysis is performed to determine an appropriate "time line" of functions or functional sequences in which time is critical to mission success, safety, utilization of resources, minimization of downtime and/or increasing availability. Times are further allocated to subfunctions to determine that sequential and concurrent actions will collectively meet the time criteria of the total function sequence. Time requirements analysis charts are used to derive time constraints applicable to performance and design requirements, and can become an important factor in tradeoff decisions where time is critical. An example of this application is emphasized in one of our classroom case studies. Analysis reveals a subfunc-

SCHEMATIC BLOCK DIAGRAM
ATTITUDE CONTROL AND MANEUVERING SUBSYSTEM

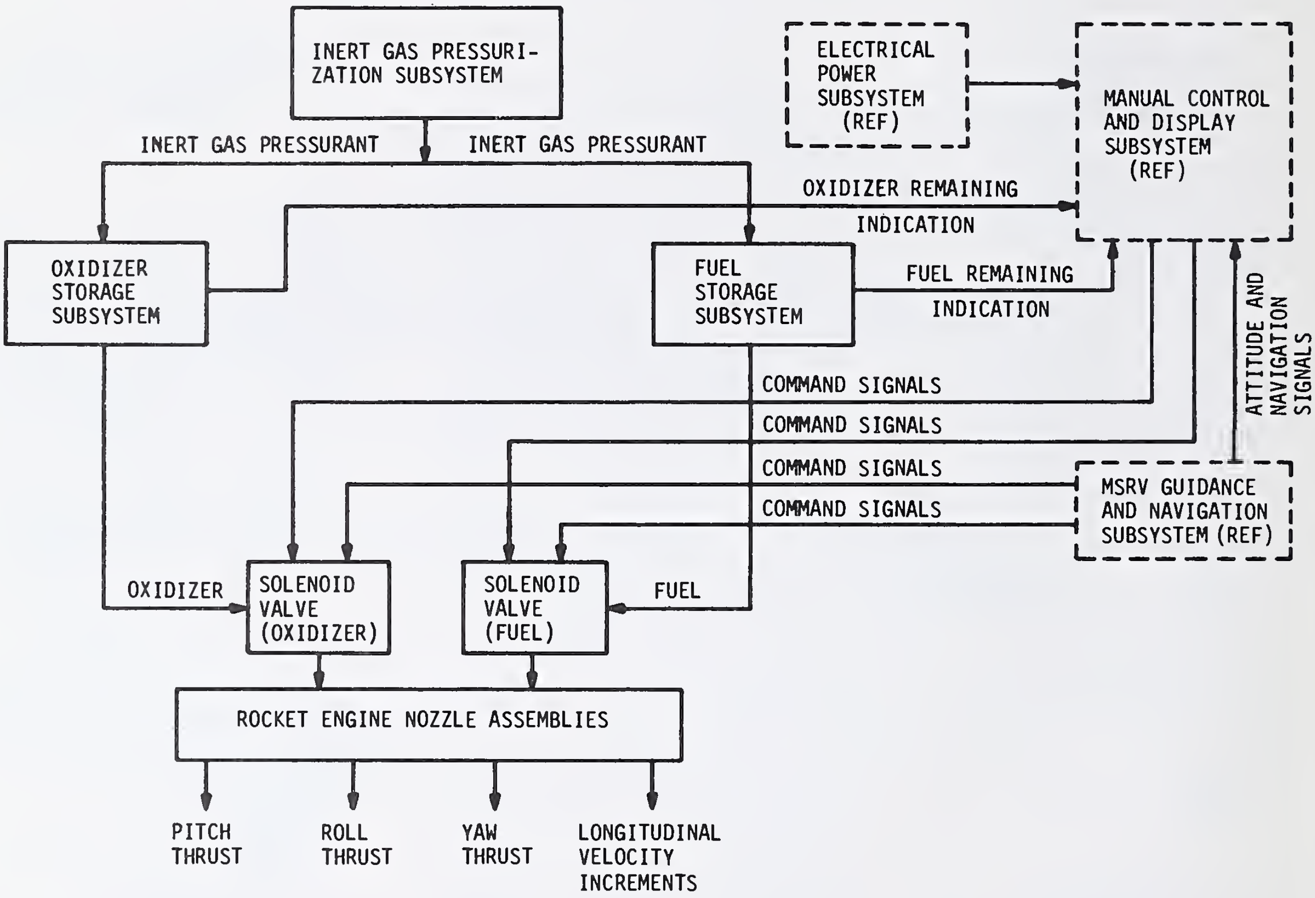

INERT GAS PRESSURIZATION SUBSYSTEM
ELECTRICAL POWER SUBSYSTEM (REF)
MANUAL CONTROL AND DISPLAY SUBSYSTEM (REF)
INERT GAS PRESSURANT
INERT GAS PRESSURANT
OXIDIZER REMAINING INDICATION
OXIDIZER STORAGE SUBSYSTEM
FUEL STORAGE SUBSYSTEM
FUEL REMAINING INDICATION
ATTITUDE AND NAVIGATION SIGNALS
COMMAND SIGNALS
COMMAND SIGNALS
COMMAND SIGNALS
COMMAND SIGNALS
MSRV GUIDANCE AND NAVIGATION SUBSYSTEM (REF)
OXIDIZER
SOLENOID VALVE (OXIDIZER)
SOLENOID VALVE (FUEL)
FUEL
ROCKET ENGINE NOZZLE ASSEMBLIES
PITCH THRUST
ROLL THRUST
YAW THRUST
LONGITUDINAL VELOCITY INCREMENTS

Figure 2.

Schematic block diagrams are the usual tool for portraying the functional interfaces and apportioning major system requirements. They are updated as other quantitative system performance parameters are identified during latter stages of the system engineering process.

E. Oakley Drumheller Jr. serves as an industrial engineer with the Army Management Engineering Training Agency. Until recently, he worked with the General Electric Co. in the space program. He holds a B. S. degree in electrical engineering from Virginia Military Institute and an M. S. in systems management from Florida Institute of Technology.

Forrest L. Godden Jr. serves as industrial engineer with the Army Management Engineering Training Agency. Before joining this Army training agency, he was with the Supply Directorate at McClellan AFB, Calif. Prior to entering government service, Mr. Godden worked in private industry. He holds a B. S. degree from Iowa State University.

John F. Schwegler serves as industrial engineer with the Army Management Engineering Training Agency. Prior to joining AMETA, he served for 15 years with International Harvester Co. He holds a B. S. degree in industrial engineering from Illinois University and an M. S. in industrial and management engineering from the University of Iowa.

tion allocation of 30 seconds for a 150-yard evacuation of a crew-served missile launcher. This time allocation is found to be insufficient and highlights a constraint on the effectiveness of the system.

Synthesis

Synthesis, classically known as conceptual design, is the point in the system engineering process at which engineering creativity and state-of-the-art technology are brought to bear on the creation of a system or design concept to satisfy stated requirements. It is imperative that all system elements be properly considered in arriving at a design concept.

Initially, synthesis is performed to postulate possible technical approaches and, supporting each technical approach, one or more system concepts. Later, during successive iterations of the process, one or more design concepts are synthesized for each system concept. The configuration or arrangement of system elements and the technique for their use are portrayed in some suitable form such as a schematic diagram shown in Figure 2. The purposes of these portrayals are to:

- Depict a complete response to the function need.
- Provide alternatives for tradeoff studies.
- Depict compatibility between elements of the system and interfacing systems.
- Permit traceability between the elements and their functional origin in the operational usage.
- Assure complete and comprehensive change control.

Within each synthesized solution, characteristics of the system elements are balanced in accordance with the established measures of effectiveness. Following evaluation and decision, portrayal of the synthesized system in terms of its elements will provide a source of data for:

- Equipment design and interface control documentation.
- Consolidated facility requirements.
- Contents of procedural handbooks, placards and similar forms of instruction/data.
- Task loading of personnel.
- Consolidated computer programs.
- Product elements of the work breakdown structure.
- The specification tree.

Evaluation and Decision

Evaluation is required to establish that a feasible and adequate design concept has been synthesized. Actually, evaluation is continuous in the system engineering process. The objectives of the decision-making process are to achieve a balance between performance, schedule, and total system life-cycle cost with a minimum of risk. Whenever alternate functions and/or synthesized solutions evolve, evaluation and decision is enhanced by conducting tradeoff studies.

Additionally, an effectiveness model, relating design parameters to established measures of effectiveness, must be developed. The output of this model should provide another means of choosing one of several synthesized combinations of system elements, and should facilitate investigation of the effects of parametric changes on overall system effectiveness.

System Description

The description step of the system engineering process produces engineering data, resulting from previous steps of the process, that defines the arrangement and use of all system elements and their effectiveness requirements for achieving functional performance. Naturally, description of the system becomes progressively more definitive as the program proceeds. However, at the beginning of each phase, the descriptions must be sufficient to provide a proper baseline for technical decisions and/or any associated contracting purposes. Description data may be in such form as specifications, design descriptions, schematics, layouts, detailed drawings, personnel and training requirements data, and engineering reports. It may also include physical and mathematical models and computer programs.

It is not possible to specify precisely the depth of detail of data required for any phase of a project. In the early phases, description data should be confined to performance requirements so as not to unduly constrain creative design, but to allow subsequent engineering activities as much flexibility as program objectives will permit.

In the area of contracting, it is important that the technical and engineering information contained in the contract data items be identical to those actually used to control the technical development program. Information must also be traceable to its source in the system engineering process so that the Government can be assured that the contractor is working to the same set of requirements as those he has contractually submitted.

System Engineering Management

System engineering management encompasses the system engineering process and integration of all engineering activities and technical aspects of the system/project from receipt of a user requirement through delivery to the operational inventory and ultimate disposal (Figure 3).

System engineering management is one of the major functions of project

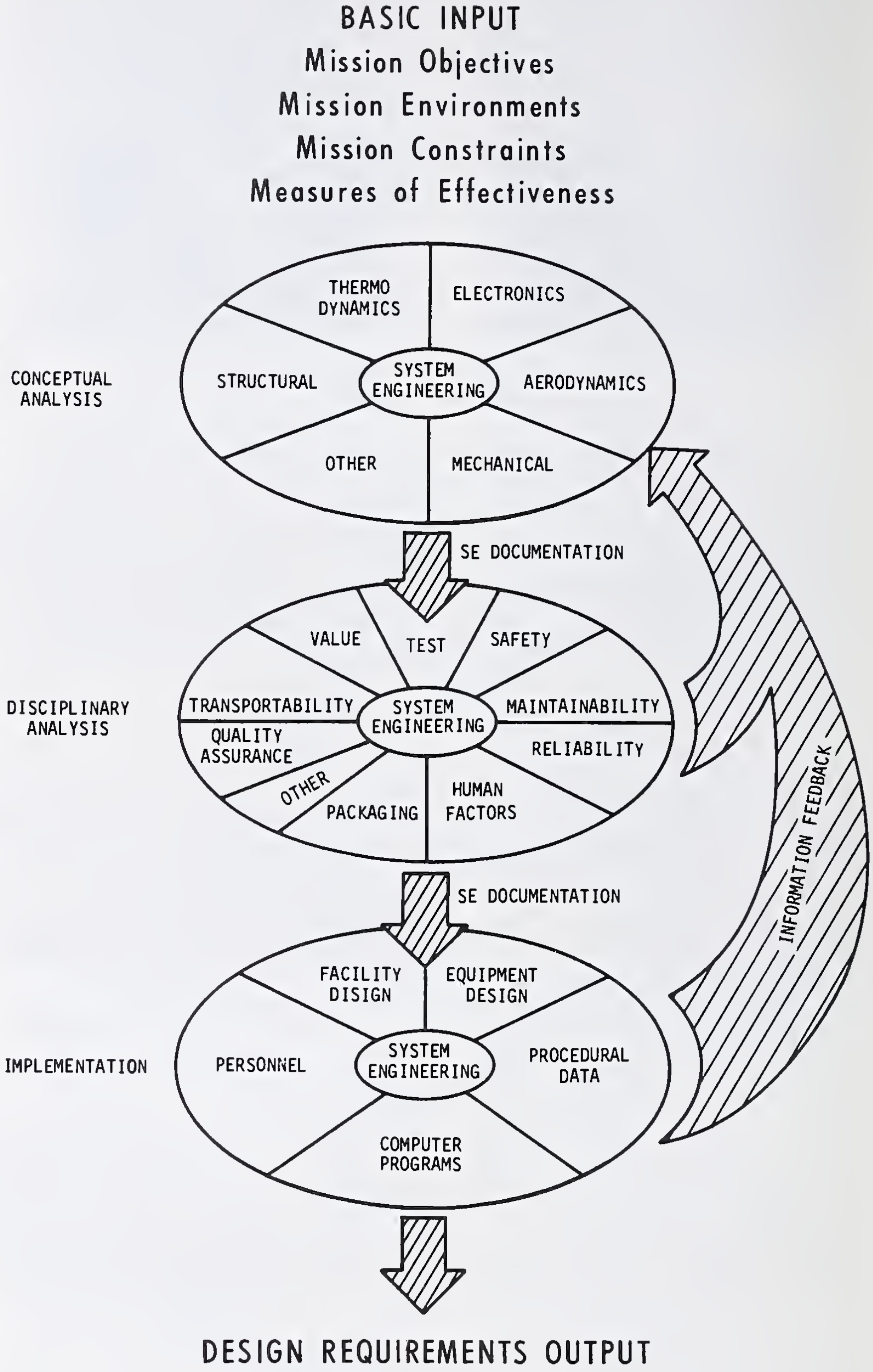


Figure 3.

Significant system engineering and specialty participation at the pertinent points of the decision-making process are represented as three imaginary tables. This multi-discipline interface is of primary concern in system engineering management.

management. It is closely interrelated with configuration management, product assurance, integrated logistic support, and cost/schedule planning and control. There are various levels of system engineering management. These range from top level management exercised by the materiel developer to the most detailed level to which the performance and design requirements of system elements are controlled by the contractor or equivalent government agency.

The following requirements should be documented in a System Engineering Management Plan to assure effective system engineering management:

- Mission Requirements / Constraints—Interpretation, clarification, and validation of basic inputs to the system engineering process.
- Responsibility/Authority — Identification of organizations and key personnel for managing system engineering efforts, and definition of responsibilities, lines of formal communications, and functions of personnel associated with system engineering policy.
- Resource Allocation. Allocation of funds, schedule, and expertise necessary to achieve effective system engineering.
- Procedures. Process for accomplishing system engineering through all phases of the program.
- Documentation/Format. Procedures for initiation and management of all system engineering documentation.
- Design Reviews. Schedules and procedures for comprehensive examination and review of all aspects of the design.
- Interdisciplinary Integration. Procedures to assure design compatibility from the standpoint of all pertinent engineering and scientific disciplines.
- Engineering Decision Process. Formal internal procedures using system effectiveness models, tradeoff studies, risk analysis, and other models.
- Program Assurance. Selection of technical measures to be executed to reduce risks and unknowns associated with critical areas of the program.
- Change Control. Formal internal procedures necessary to control all technical data that has an impact upon configuration, performance requirements, design constraints, or functional/physical interfaces.
- Work Breakdown Structure. Structure of products and services comprising the entire work effort.
- Training. Methods and procedures that will be used to train selected personnel in the system engineering process, methodology and rationale.
- Technical Performance Measurement. Identification of items having significant impact upon system effectiveness; identification and quantification of parameters having significant impact on system effectiveness; establishment of analytical or test criteria for the estimation or measurement of technical performance; estimates or measures, evaluations and forecasts of all significant technical performance characteristics of the system through the design activity.
- Tailoring. Deletions, alterations, or additions of requirements to adapt to the peculiarities of specific systems or subsystems.
- Milestones/Schedules. Identification and establishment of cost, time and performance accomplishments essential at a specified point in time to meet the objectives of the system engineering effort.

This article has discussed what system engineering entails, but why do we really need it?

Since the Korean conflict, the importance and complexity of engineering specialties have required increased specialization in weapon system acquisition procedures. Separately procured components may not function as planned when incorporated into the total weapon system. Personnel training may not be appropriate for the operation to be performed. Schedules and budgets may be excluded from consideration.

To remedy these deficiencies, procurement practices have had to be reviewed and revised.

The design, development, and management of today's complex weapon systems require the use of new approaches, new tools and new techniques. System engineering responds to this challenge.

Partnership in Disaster Preparedness

John E. Davis

In the United States, disaster preparedness efforts have unquestionably done much to keep down the loss of life and destruction of property in the *peacetime disasters* that occur every year, just as they would in case our nation ever experiences the "ultimate crisis" of a nuclear attack.

American industry and Government share the responsibility and the task of protecting Americans from harm and their property from damage, in peacetime and in wartime. It is one of the most essential efforts that Government and people can jointly engage in.

All over America, peacetime dangers are increasing year after year, in both frequency and severity. And so is the demand by the American people for protection against such perils as natural disasters, industrial and transportation accidents, fires, explosions, and highway crashes.

But in the past decade especially, two *new* dangers have been added to the list: civil disturbances and environmental pollution.

The social revolution of the 1960s in America has been marked by violence of a new dimension, surpassing in frequency and severity any this nation has ever seen before. And the technological and social changes of the past decade have caused a great deterioration of our environment.

Both of these new perils—social violence and environmental pollution—have added greatly to the sense of uncertainty most Americans feel. This has intensified their demands for protection against these and the other peacetime perils I mentioned, because they feel helpless to cope with these conditions individually. The old phrase "somebody's got to do something about this" is no longer a plea, or a plaintive, rhetorical statement. It's a *demand.* More and more Americans are calling—some loud and clear, others quietly but firmly—for more protection againt the hazards that threaten their lives, their property, their environment, their institutions, their way of life, and even the destiny of their nation.

To whom is this call for protection being directed? Mainly to Government—on the local, state, and Federal levels—because Government is charged with acting in the interests of all citizens, and taking care of problems they can't handle individually. As Thomas Jefferson said 200 years ago, "The care of human life and happiness, and not their destruction, is the first and only legitimate object of good government." And at about the same time, the English statesman, Edmund Burke, wrote that "Government is a contrivance of human wisdom to provide for human wants. Men have a right that these wants should be provided by this wisdom."

The 1970 demand for safety and security is not being made only to Government. It's also being made to *all responsible elements* of our society—especially to business and industry, institutions, organizations, professions, and even to individuals who have influence on the course of public affairs.

Who is responsible for meeting this demand?

All of us.

We all live and work in communities; both ourselves and our organizations are—or surely should be—responsible, participating, contributing members of those communities. And since most disasters are local in nature, it is at the *community level* that they can best be anticipated, guarded against, prepared for, and coped with when they occur. While there are some peacetime hazards that require action at the state, regional, or national level, the most effective action is local.

Washington alone, meaning the Federal Government, simply cannot do some of the jobs that have to be done, such as protecting the people of a community from peacetime disasters.

It is clear that today's public demand for protection can be met effectively only by full mobilization and use of *all the community's protective resources.* Local governments bear primary responsibility for protecting their citizens, and most of them have developed an emergency preparedness capability. They have become organized, equipped and ready to cope with peacetime and wartime disasters. In other words, they have established their *civil defense systems,* which we define as "civil government organized,

John E. Davis is Director of Civil Defense and head of the Office of Civil Defense in the Office of the Secretary of the Army, Washington, D. C. Before assuming this position in May 1969, Mr. Davis served two terms as Governor of North Dakota from 1956 to 1960, and was National Commander of The American Legion from 1966 to 1967. He is a graduate of the University of North Dakota with a degree in business administration.

equipped and ready to take action in time of emergency to save lives, alleviate suffering, and protect property."

But in most cities and towns, I am convinced, these civil defense systems are not so good as they could be and should be. I believe much better protection—against all hazards—would be provided to citizens:

- If the local government's emergency plans included full mobilization and use of *all* protective capabilities in the community, both public and private.
- If the emergency plans and protective capabilities of all community organizations, such as your companies and institutions, were fully coordinated with the local government's emergency plans and capabilities.
- If most of the community's organizations and individual citizens became members of the "civil defense team," by being aware of emergency preparedness activities and participating in them, even to such limited extent as learning individual protective actions or emergency skills such as first aid.

Clearly, there is a special role for industry in meeting the challenge of the 1970s and providing the American people the protection they are demanding against peacetime and wartime hazards.

In essence, I am asking industry to enlarge its horizons, and to look to its responsibility and opportunity to serve *all* the people of its communities. You are particularly qualified to make valuable contributions to your communities and your fellow citizens.

Industrial management is primarily responsible to its companies, employees, and stockholders. But I am asking you to enlarge your vision; to recognize *also* your obligation to the communities where you live and work, and to the people of those communities. I am asking you to use your talents more fully, by helping to create more effective community-wide systems for protecting people against both peacetime and wartime hazards.

How can you do this? I have a few suggestions. You can:

- Add to the overall emergency preparedness of your community by doing the best emergency preparedness job you can do for your own organization. If all companies and organizations in a community provide the best protection for their employees and their property, that is a very large step toward a good community system.
- Coordinate your emergency plans with the local government's plan; and "fill in the gaps" in the community's protective capability with whatever resources you have that are not needed to protect company employees and property. I have in mind such things as making available fallout-shelter space for the general public, after company employees are provided shelter; making company equipment available for either precautionary use (such as communications equipment) or rescue operations (such as trucks and bulldozers); providing company personnel to operate such equipment; and conducting training classes.
- Help your local civil defense director build a better civil defense system in your community. Keep in mind that the civil defense director—if he is a good one—will *welcome* all the help he can get, especially such expert help as you can give him. Also, remember that he does not have a large corps of special "civil defense workers" at his command. In actuality, he is simply what you might call the "emergency chief of staff" to the mayor or city manager. He is responsible for coordinating the emergency actions of the regular departments of the government—assisted by some auxiliaries. *Your* coordination with the local civil defense director for best use of company and community resources is most important.
- Develop within your own company or organization a better understanding of emergency preparedness; and create increased understanding and support of the community's civil defense effort by informing and educating your employees in emergency procedures. Company officials, as opinion leaders in the community, can engender widespread public support for civil defense; and company employees all have their circles of influence.
- Provide training in emergency skills and preparedness procedures to your company personnel, so that in a time of emergency they can help save their own lives and those of other people. Also, encourage company personnel to become part of the community's emergency force by accepting civil defense assignments for which they have been trained.

Helping in these ways to develop more effective local civil defense systems makes industry a true partner of Government in protecting people and property from the effects of both wartime and peacetime disasters.

There is very little difference between preparedness for nuclear attack and preparedness for major peacetime disasters. My basic concept is this: Communities that are well prepared to cope with peacetime catastrophes are also well prepared to cope with nuclear attack effects—if their residents have fallout shelter available to them. The other preparations and actions are just about the same.

All states—and all local governments that I know of—include peacetime disaster responsibilities in the total mission of civil defense. Although it is not specifically spelled out in our legislative charter, as far as I am concerned it is only good common sense for the U.S. Office of Civil Defense to help state and local governments protect their people in both peacetime and wartime emergencies.

We in Office of Civil Defense believe that a nuclear attack on the United States is not likely, but is well within the realm of possibility; and, therefore, all possible actions should be taken now that would save lives at the time of an attack. The state and local governments, generally speaking, share this view. But as most of you know, the major portion of civil defense effort at state and local level is devoted to the peacetime emergencies and disasters that occur every year.

That is why I have emphasized in this article the key, essential role of *community* civil defense systems in the emergency preparedness structure of the United States. And that is why I have emphasized that these community systems must improve their capability to cope with the here-and-now disasters that occur in peacetime.

People in the defense industry are uniquely qualified to strengthen the community civil defense systems of America; and to help provide the full-coverage protection that Americans need, are entitled to, and are calling for.

Army Inertial Guidance Management and Technology Center

Focal Point of Inertial Research and Development

Dr. John L. McDaniel

Dr. John L. McDaniel has been Director of Research and Engineering, Army Missile Command, since March 1970. Prior to assuming this position, he served in the directorate as Technical Director for eight years. He has been actively engaged in all phases of development and testing of Army missiles in the command since 1949. He is a graduate of Berry College with a B. S. degree in chemistry. In 1968, he was conferred a doctor of science, Honoris Causa, by Auburn University.

Early in the 1960s, considering increasing Army requirements for inertial guidance instruments, it became apparent that significant savings in this field could be achieved by eliminating duplication in inertial research facilities, material, and personnel. To achieve this goal, an organization was needed to serve as a focal point to keep abreast of inertial research within Government and industry. This was the prime motivation behind the establishment of the Army Inertial Guidance Management and Technology Center (AIGMTC) within the Research and Engineering Directorate of the Army Missile Command, Redstone Arsenal, Ala.

Until AIGMTC was established, there was almost a total dependence on industry for inertial instruments. There was a conspicuous lack of facilities and trained personnel throughout Army agencies to conduct inertial work and to evaluate industry proposals responding to Army needs.

At the outset, AIGMTC was charged with the responsibility to develop talent within the Army capable of research, development and evaluation of complex inertial equipment.

Inertial guidance work at AIGMTC interfaces with industry and other government agencies active in the inertial field in several ways. Industrial independent research and development (IR&D), as well as technical proposals from industry in response to DOD needs, are reviewed and assessed by AIGMTC personnel. Special reviews are conducted on specific projects initiated by the Army, other government agencies, and industry. AIGMTC maintains a technical data file with inputs from government agencies as well as from industry. Information on new developments at the center is made available to industry and other government agencies through published reports and presentations at major conferences and symposia. Finally, AIGMTC personnel serve as members of technical panels of the Army and of defense-oriented associations.

IR&D Evaluation

A review of an industrial IR&D project, study, or development by AIGMTC covers:

- Assessment of IR&D efforts with regard to present or known future Army requirements.
- Assessment of academic background, professional experience, and past achievements.

- Objectives as they relate to the state of the art with other industrial efforts, as well as Army in-house and contract efforts.
- Identification of efforts having essentially commercial objectives, or which the Government will procure as off-the-shelf items.
- High risk aspects of certain IR&D efforts and methods by which the efforts may be made more acceptable for direct support by the Army.
- Technical suggestions which offer potential improvement of the industrial effort.
- Assessment of funding and man years allocated by manufacturer for completion of IR&D tasks.

Some examples of IR&D programs evaluated by AIGMTC are listed in Figure 1.

The center also furnishes team members for on-site evaluation of IR&D programs. These on-site reviews are joint efforts with participants from all the military services.

Technical Proposal Evaluation

AIGMTC participates in contractor selection involving inertial components and/or systems and support, and technically supervises contractor efforts. For example, representatives of AIGMTC served on the panel which evaluated three technical proposals submitted by industry organizations for the Air Force Systems Command's Program 688G. Program 688G was designed to fulfill the requirement of the Director of Defense Research and Engineering that performance verification of aircraft inertial navigators be accomplished prior to their procurement.

In another instance, the center's personnel reviewed the purchase description and assisted the Army Engineer Topographic Laboratories in evaluating industry proposals for a Position and Azimuth Determining System (PADS).

AIGMTC is also supporting the evaluation of a Completely Integrated Reference Instrumentation System (CIRIS) at the Central Inertial Guidance Test Facility, Holloman AFB, N.M. CIRIS, intended for application by all three military services, will be a highly accurate aircraft reference system providing real-time, on-board positions, velocity, and altitude information.

Component and System Evaluation

To fulfill the required AIGMTC mission of providing pertinent and relevant technical consultation to the Army in the inertial area, it is essential that personnel of the center keep abreast of the latest trends and techniques in missile technology. Accordingly, new and innovative inertial equipment is bought each year for design and performance verification. Technical reports are published by AIGMTC at the conclusion of each test, providing results and analyses of the examination. Reports on non-proprietory items may be obtained by industrial sources by addressing a request to: Army Inertial Guidance Management and Technology Center, Attention: AMSMI–RGL, Redstone Arsenal, Ala. 35809. Non-proprietory reports are those covering government-funded development tasks or tasks performed by government laboratories.

Typical evaluation programs relative to component and systems evaluation for which the center has been responsible include:

- Flight Reference Stabilization System (FRSS).
- Multifunction Sensor.

Inertial Instrumentation IR&D Programs Evaluated by AIGMTC

Program Category	Proposed IR&D Programs
Inertial Systems	Strapdown Inertial Navigation System Development
	Brute Force Stabilization Reference System
	Reentry Inertial Measuring Unit
	Advanced Miniature Platform P–1000 Development
	Advanced Stabilization Site
	Hand Held Weapon
North Seeking Device	Rapid Determination of North
	Low Cost Gyrocompassing
	North Orienting Device
Inertial Sensors	Flexure Pivot Gyro
	Flight Control Sensors
	Inertial Devices
	Vibrating Gimbal Multisensor Research
	Vibragimbal Gyro G–1200 Development
	Miniature Multiple Rotation Gyro
	Fluid Sphere Gyro Signal-to-Noise Improvement
Special Purpose Circuitry	Modular Microelectronics Development
	Pulse Torquing for Inertial Measuring Unit
	Microelectronic Techniques
	Microcircuit Electronics
Special Studies	Advanced Inertial Sensor Studies
	Advanced Low Cost Marine Inertial Studies
	Statistical Control Theory and Applications
	Reentry Vehicle Guidance Techniques
	Vehicle Power Drive Techniques
	Special Purpose Digital Filtering

Figure 1.

- Q-Flex Accelerometer.
- Compliant Bearing.

Two specific missions of AIGMTC are to continually upgrade the level of in-house technical competence in the area of inertial systems and components, and to maintain an in-house design capability to meet Army inertial systems and components requirements. It is generally acknowledged that the best, and perhaps only, way to maintain or upgrade design capability is to actually perform the work.

The center's expertise in missile guidance techniques is adequately supported through continuing work in supporting or advanced research. However, the only deliberate exercise of talent in other inertial areas of Army interest, such as navigation, surveying, fuzing, and stabilization, has come from AIGMTC-sponsored projects of the types specified for this work area. Only in this manner can the required expertise be maintained to support the total Army inertial programs. Development programs in this area, which are typical of those conducted by AIGMTC, include:

- Solid State Accelerometer.
- Laser Gyro.
- Crystal Constrained Gyro.
- Ultraminiature Platform.

Technical Panels

Intra-Army coordination of current and future programs, objectives, funds, facilities, and other significant requirements are accomplished principally by the Army Technical Panel on Inertial Guidance. Activities of the Army panel include:

- Review of the status of Army research and development programs.
- Discussion of problem areas.
- Assessment of the state of the art and technological trends.
- Discussion of future requirements.
- Inventory and strengthening of Army resources.
- Assistance in standardizing testing techniques and performance specifications.

The Army Technical Panel on Inertial Guidance attempts to meet quarterly under the chairmanship of AIGMTC, and consists of representatives from each Army agency having responsibility for specifying, developing, or using inertial systems or components. Representatives of the other military services and industry are invited to participate in these meetings, and to present topics of common interest.

In addition, AIGMTC maintains continuing liaison with industrial groups active in the inertial field. For example, AIGMTC personnel are active members of the Gyro and Accelerometer Panel, a technical committee of the Aerospace Electronic Systems Group of the Institute of Electrical and Electronics Engineers; and the Geokinetic Subcommittee of the American Institute of Aeronautics and Astronautics.

Technical Data File

The center maintains a technical data file containing information most desired by inertial system and component designers. It contains information on physical characteristics, performance specifications, design features, development history, and test results—the so-called technical parameters. In addition, it shows prior program usage, availability, cost, vendor and his past performance, and principal investigator (in case of a research item) or the key contact personnel.

The file is maintained and updated by incorporation of inputs from industry and military users. Industry may also obtain data from this file by addressing requests to: Army Inertial Guidance Management and Technology Center, Attention: AMSMI–RGL, Redstone Arsenal, Ala. 35809.

Summary

Establishment of AIGMTC was an initial step in management science to coordinate activities of all military services on a national basis, sharing a common goal of system and cost effectiveness. The center provides assistance and technical expertise in devising workable solutions to numerous and varied problems. The goal of the center is to stimulate communication within the Army and with other government agencies and industry to promote mutual confidence and respect.

Security Education and Training: Preventive Against Compromise

James A. Reeder

Rather than create the impression that the subject of this article covers all facets of security education, I must first point out that the Defense Industrial Security Education and Training Program is directed toward one basic objective—safeguarding classified information entrusted to industry. Other areas of security such as fire, safety and plant protection do not fall within its charter and hence are not addressed.

The question frequently arises as to what difference there actually is between education and training. To me, training is a narrow term while education is much broader in concept. Training in security circles denotes learning which is specific, *i.e.* instruction in certain basic skills which will assist an individual in performing in a certain way. Additionally, the individual must understand the meaning and purpose of the security requirements placed on him in order to assure willing, conscientious compliance. Hence, security education must be made at least an equal partner with security training in the development of the complete, professional security program.

A look at what constitutes an effective security education program in industry best illustrates why both the broad (educational) and narrow (training) concept is necessary. To achieve the basic objective, there are five specific objectives to be met. The program must:

- Provide all personnel with the knowledge of security requirements which they require for proper performance in their positions and assignments.
- Remind supervisors of their responsibility for assuring that classified information is effectively and economically safeguarded.
- Ensure willing, conscientious compliance with security regulations, procedures and practices.
- Advise all personnel who have access to classified information of the hazards of its disclosure to any person not authorized to receive it and of their responsibility for exercising personal vigilance for its protection.
- Inform all personnel of the techniques and devices employed by foreign intelligence activities in attempting to obtain classified information and of their responsibility for reporting such attempts.

Obviously a multi-faceted approach to meet these objectives is essential.

A most important element in assisting industrial management in its security education responsibilities is the service provided by Defense Supply Agency's (DSA) industrial security representative. This trained and experienced professional is the personal contact industry has with the government's cognizant security office. He is available to furnish advice and assistance to each facility in development of its Standard Practice Procedure (SPP). (The SPP is the contractor's written procedure to execute the requirements of the Department of Defense Industrial Security Manual for Safeguarding Classified Information.) The DSA industrial security repre-

James A. Reeder is Chief of the Defense Industrial Security Education and Training function in the Office of Industrial Security, Contract Administration Services, Defense Supply Agency. He has served in a variety of intelligence and security assignments, both in Government and industry, for the past 24 years. In addition to being an honorary faculty member of the U. S. Army Intelligence School, Mr. Reeder has served as an instructor in industrial security and plant protection subjects at Temple University.

sentative brings to the facility an expertise gleaned not only through the education and training, but from his own observations in the many different contractor operations he inspects.

Security Education Base

A formal, institutional base for education of industry and government representatives exists in the Industrial Security Committee of the U.S. Army Intelligence School at Fort Holabird in Baltimore, Md. Since 1955 this committee has been conducting classroom instruction on the Defense Industrial Security Program. Through FY 1970 over 7,200 industry students have graduated from the courses offered by this school. An additional 3,442 students, representing government activities engaged in classified procurement or involved in security inspections, have attended one or more of the government classes.

To augment the one-week resident courses for contractors conducted at Fort Holabird, field extensions have been presented in major cities throughout the United States. At least four of these field extensions have been scheduled each year in the past with an increase to six planned for FY 1971. These field extensions are hosted in each city by one of the DSA Defense Contract Administration Services Regions, which are the cognizant security offices in their respective areas. The value of the field extensions is readily discernable in a numerical evaluation. While resident courses have averaged 31 students per session, the field extensions have averaged 89. Lest the impression be given that 89 students is an unwieldy number for a class, it should be noted that where the number of enrollments exceeds 50, the group is divided into two classes with instructors handling twice the number of sessions as normally conducted for a single class.

Contractor representatives are enrolled in either the resident or field extensions of these Industrial Security Management Courses by contacting their cognizant security offices. Due to the classification of certain hours of instruction, the student is required to have been granted a minimum of a Confidential security clearance.

The program of instruction for the Industrial Security Management Course is designed to provide adequate education for industrial management in all facets of the DOD Industrial Security Program. When graduated from this course, the manager has a good foundation on which to develop an in-house education and training program for his own facility. Two categories of subjects are included in the course:

General:

Introduction—History of the Program.
Industrial Security Organization—Defense Supply Agency.
Security Agreement and Appendages.
Applicable Laws and Regulations.
Hostile Threat to Industry.
Industrial Security Definitions.
Security Alarm Devices.
Technical Demonstration of Defense against Sound Equipment and Methods of Entry.
Questions and Answers Panel

Security Requirements:

Industrial Security Manual.
Security Requirements (Handling, Marking, Transmission, Storage).
Facility Clearance Actions.
Personnel Clearance Actions.
Clearance Review Program.
Cryptographic Security.
Security Classification and Declassification.
Subcontract Award Requirements.
Security in Graphic Arts Facilities.
Visitor Control.
Security Education.
Recurring Inspections.
Violations and Compromise.
International Aspects of the Program.

Company Education Program

Due to the numerous types of industries cleared under the Defense Industrial Security Program and the many different job skills involved, no single program of instruction would be equally applicable for all. In other words, each facility must custom tailor its security education and training program to its individual needs. The place to start is with the facility's Standard Practice Procedure.

The development of a contractor in-house program can best be accomplished by an analysis of *what* security requirements apply at the facility. (For example, requirements relative to the safeguarding of Top Secret information would not be covered in a facility which is cleared only for Secret.) By listing these requirements, a broad topical lesson plan outline for training employees emerges. Next, a determination is needed to select those employees who require knowledge of all topics and those holding jobs who require only "limited" knowledge of specific requirements. This selective grouping method is more economical and academically beneficial than giving everyone the total course treatment.

Most security educators agree that short sessions (30 to 50 minutes) conducted over several weeks accomplish more than trying to cover the total program in a single session. In addition to training personnel on specific procedural requirements, there is a need to motivate individuals at all echelons to ensure "willing, conscientious compliance." One of the better media for this exists in the security films available for loan or purchase.

Each of these DOD security films offers education on one or more of the five specific objectives set forth earlier. All provide a degree of motivation and instruction. Cleared defense contractors and government activities may obtain these films *on loan* by contacting the Director, U.S. Army Audio-Visual Support Center, at one of the following addresses:

Fort George G. Meade, Md. 20755
Frankford Arsenal, Philadelphia, Pa. 19137
Sixth Army, Presidio of San Francisco, Calif. 92129
Fort Wadsworth, N.Y. 11252
Fort McPherson, Atlanta, Ga. 30330
Fifth Army, Camp McCoy, Wis. 54656
St. Louis Area Support Center, 12th & Spruce St., St. Louis, Mo. 63103
U.S. Army Tank-Automotive Command, Warren, Mich. 43090
Fort Sam Houston, San Antonio, Tex. 78234
U.S. Army Support Detachment, Oakdale, Pa. 15071
Fort MacArthur, Calif. 90731
Fort Devens, Mass. 01433

Contractors desiring help in obtaining or using these films can contact the Office of Industrial Security in the Defense Contract Administration Services Region (DCASR) nearest their facility.

Additionally, these films may be *purchased* from the Sales Branch, National Audiovisual Center, General Services Administration, Washington, D.C. 20409. A synopsis of each film with its identification and cost is given in Figure 1.

Security Films

The Case of Comrade T (DODIS–1)—23 minutes, color.
Depicts the methods used by an espionage agent to gain access to classified information in various industrial facilities.
$78.25

The Hollow Coin (DODIS–3)—30 minutes, black and white.
A documentary concerning the events leading up to, during and following the trial of convicted Soviet espionage agent Rudolf Abel. This film furnishes proof of the existence of espionage activity against the United States.
$27.00

The Daily Enemy (DODIS–4)—20 minutes, color.
Depicts carelessness, complacency and ignorance as enemies of good security. Shows incidents of the more common security violations and motivates viewers toward good security practices.
$48.50

The Security Man (DODIS–5)—30 minutes, black and white.
Treats six problem areas confronting industrial security personnel. Security violations are exposed and corrective actions are depicted.
$30.50

The Secret Underworld (DODIS–6)—25 minutes, black and white.
A documentary concerning the case of convicted spy Gordon Lonsdale in the United Kingdom. Further evidence that the espionage hazard is real. (Not for sale.)

The Enemy Agent and You (DODIS–7)—25 minutes, black and white.
Reveals techniques and devices used by enemy agents to obtain defense information. Emphasis is placed on security consciousness and disciplined moral behavior, particularly when traveling in a foreign country.
$43.75

Unauthorized Disclosure (DODIS–8)—12 minutes, black and white.
Depicts situations where unauthorized disclosures of classified defense information could occur. Viewer is motivated to follow proper procedures to prevent unauthorized disclosures and is furnished convincing arguments against indiscriminate releases of classified defense information.
$22.25

The Smile and the Sword (DODIS–9)—20 minutes, black and white.
Depicts a foreign agent's attempts to dupe an American businessman into an espionage scheme. The scenario is based on J. Edgar Hoover's article, "The American Businessman Faces the Soviet Spy," which appeared in the Harvard Business Review.
$38.50

Defense Against the Spy (DODIS–10)—20 minutes, black and white.
Depicts several situations which show the techniques and devices employed by foreign intelligence activities in their attempt to obtain classified information and the defense against such attempts.
$35.25

Combination for Security (DODIS–11)—33 minutes, color.
Illustrates how classification determinations originate and how they affect other aspects of a security program. The film provides concrete examples of the benefits to establish a Classification Management System. (Price not yet established.)

Figure 1.

Visual Reminders

Constant reminders on security serve to reinforce the educational process. Security posters dispersed throughout the facility draw attention to matters which need to be emphasized. The Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, has stocked nine security posters for sale. The number, theme and cost of each poster presently available is given in Figure 2 (page 18).

Many industrial facilities use other security reminders such as telephone decals, coffee cup coasters, markers on security cabinets to remind custodians of the open or locked condition of the containers. Some use security slogans on calendar pages, match book covers, rulers and emery boards distributed *gratis* to female employees, who cannot help but think kindly towards security as they beautify their fingernails. All of these cause some thought on a security theme and, while their value cannot be gauged in a statistical analysis, they do serve to focus attention of employees on their security responsibilities.

Preventing Violations

Security education and management are inseparable companions to an effective security program. A case which occurred with a contractor's employee demonstrates this point quite well.

In the rush to get a Secret bid proposal to a buying activity, management forgot to brief the company's courier on the requirements of paragraph 17h of the Industrial Security Manual. This paragraph requires that classified material must be placed in specific types of storage at all stops enroute or else retained in the personal possession of the employee. Arriving after normal business hours at the buying activity, the courier decided to store his briefcase containing the Secret documents in a locker in the airport terminal, instead of taking it to a government installation or the buying activity for adequate storage.

After an evening of sightseeing, the courier returned to the airport terminal. The brief case was no longer in the locker and all efforts to recover it were to no avail.

Proper attention to assure indoctrination of the employee could have prevented the loss.

A recent analysis of closed security violation cases in industry over a six-month period developed some interesting information. Of the violation cases investigated and closed, a study of those which resulted in loss, compromise, or suspected compromise of classified information showed multiple causes for many of them. "Personal negligence" was the cause of 33 percent of the violations. The balance of causes were:

Improper Accountability (10.5 percent).
Loss or Damage by Authorized Carrier (9 percent).
Inadequate Standard Practice Procedure (7 percent).
Inadequate Security Education Program (7 percent).
Personnel Misconduct (6 percent).
Personnel Clearance not Sufficient (5 percent).
Inadequate Personnel Supervision (5 percent).
Operational Management Deficiency (3.5 percent).
Exposure from Unauthorized Entry (3.5 percent).
Miscellaneous Other Causes (10.5 percent).

While it might appear that the education program was faulted for only 7 percent of the causes, closer examination indicates that many of the other causes could have been reduced by further emphasis on the motivational aspects of security education.

Security Posters

"Don't Walk Away from Security"	D3.11/5:1.	20¢
"Security Violations Don't Just Happen—They Are Caused!"	DSA P5220.1.	20¢
"Do You Take Security Regulations Seriously Enough?"	DSA P5220.2.	15¢
"Security Is Always in Season"	DSA P5200.3.	15¢
"Let's Face It! Security Is up to You."	DSA P5220.4.	15¢
"Don't Guess! Ask Your Security Supervisor."	DSA P5220.5.	15¢
"Security Takes No Vacation."	DSA P5220.6.	15¢
"You Can't Pass It. Security Is an Individual Responsibility."	DSA P5220.7.	15¢
"Is It Really? Secret."	DSA P5220.8.	15¢

Figure 2.

Updating Policy and Guidance

Dissemination of current guidance and policy is essential to any educational effort.

An Industrial Security Letter is sent by the Defense Supply Agency to each cleared contractor facility and to many government activities at least every two months, and even more frequently as changes to the Defense Industrial Security Program are approved. This assures that each contractor is informed of the latest developments in procedures, techniques and policy that affect his program. Contractors are encouraged to reproduce these letters or otherwise disseminate those portions which are of direct interest to their employees. Most contractors use some form of internal memoranda for this dissemination. Others have made good use of their company newspapers. Still others have used the pay envelope stuffer to ensure that each individual gets personal notice of requirements affecting him.

When necessary to assure uniform understanding of security requirements, the conference technique is still the most universally acceptable medium. Many facilities use this method. One large facility with a full time security staff has its members conduct educational sessions on all three shifts. As a result, they are convinced that the security awareness generated by these sessions was a prime factor in the facility being awarded a James S. Cogswell award (plaque) in 1970 for maintaining an outstanding security program.

Professional Security Groups

Another facet of the total package of industrial security education is the participation by security personnel in meetings, conferences and seminars of professional security organizations. The various DSA offices of industrial security participate in programs sponsored by such organizations as the American Society for Industrial Security, Research Security Administrators, National Classification Management Society, the Security Committees of the Aerospace Industries Association and the Electronic Industries Association, and the Security Subcommittee of the National Security Industrial Association. Through these meetings, security professionals are kept up to date on the current state of the art of security equipment, techniques, devices and policy.

This continuous interchange of ideas and information is mutually beneficial to Government and industry and helps to identify potential problem areas with their possible solutions. Noteworthy seminars are held each year to assist cleared defense contractors in protecting classified information during emergency conditions. The benefits, while not measureable statistically, appear nonetheless. Not a single case of compromise or loss of classified information due to dissident activity at various contractor facilities has been reported.

Educating Government Personnel

Industrial security educational offerings are also available to the government representatives involved in

(Continued on back cover.)

Source Selection Scheme for Scout System

Marvin Rich

The primary function of proposal evaluation and source selection is to determine which offeror has the greatest probability of meeting military technical requirements and of successfully delivering the required quantities of the end items concerned at the most reasonable price.

Source selection is based upon an examination of the requirements, facts, recommendations, and government policies relating to a competitive procurement. The decision to select a source follows a comprehensive evaluation of competitive proposals by the formal source selection process. This process is probably the most important single step in assuring success of a program, or perhaps, assuring failure.

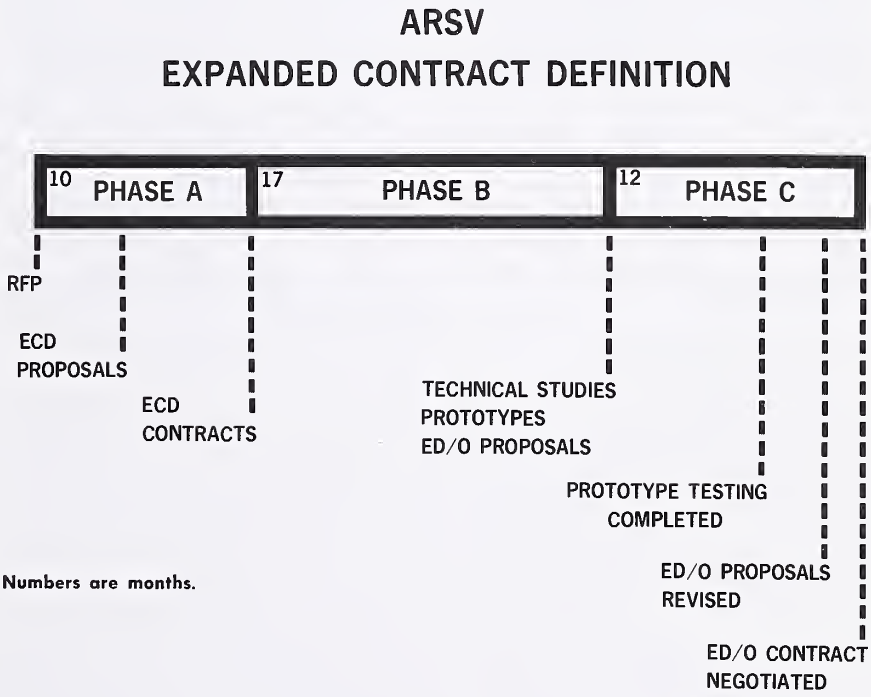
Much emphasis has been placed on improving methods of materiel acquisition through the Army Materiel Command's (AMC) Program for the Refinement of the Materiel Acquisition Process (PROMAP–70). Much of PROMAP–70 is devoted to the period in the acquisition cycle after award. Plans for proposal evaluation and source selection must be made long before award and, in fact, long before release of a solicitation. The Armored Reconnaissance Scout Vehicle (ARSV) Project Manager's Office at AMC's Tank-Automotive Command, Warren, Mich., has been devoting considerable time and effort to the selection process for this vehicle. A specifically tailored plan has been developed with some possible application to other major programs.

The Scout vehicle is to be a small, lightweight, lightly armored, highly mobile, agile, quietly operating vehicle with swimming capability. It will incorporate superior/optimum cross-country mobility, agility, day and night vision, crew protection, and amphibious operation characteristics. It is to be air transportable and is defined in terms of performance characteristics only. The Scout is designed to increase significantly the capability of U.S. forces to gain information of the enemy and terrain, and to provide security from surprise for the ground combat forces. It is intended that the Scout will replace the M114A1 Command and Reconnaissance Carrier in the Army's inventory.

New Procurement Approach

Two distinct procurement efforts are involved in the Scout program. The first, expanded contract definition (ECD), provides hardware competition to assist in selecting a single contractor for the development/advance production engineering and production phases, in addition to the usual paper studies in contract definition (Figure 1). In the initial procurement step, Phase A, requests for proposal (RFPs), soliciting fixed price incentive proposals for the ECD effort, are released. Scout RFPs will require competing offerors to describe their concepts for the total program, and to define and price out a specific approach for accomplishing each ECD objective.

Contractor performance begins in Phase B with award of two or more


ARSV
EXPANDED CONTRACT DEFINITION

Numbers are months.

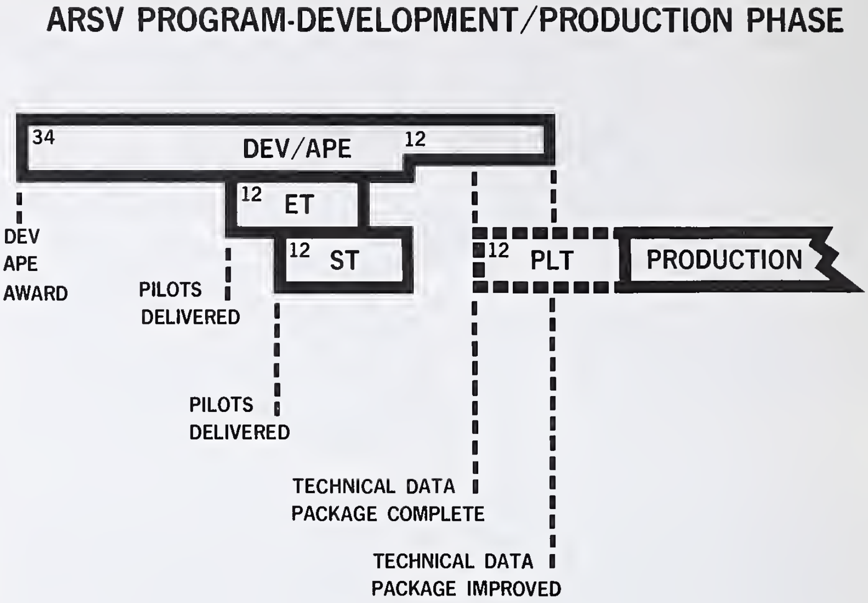
Figure 1.

ECD contracts. Deliveries of the technical studies and prototypes for test are concluding actions of this phase. Each of the competing contractors also must submit a proposal for engineering development with options for production quantities.

Phase C represents the time devoted to thorough testing of the prototypes and government evaluation of the contractors' proposals. As a result of experience gained from fabrication and government testing of the prototype vehicles, contractors will revise their proposals, as necessary, to best define the prospective engineering development and production effort and refine cost estimates.

Following a comprehensive evaluation and source selection at the conclusion of the ECD effort, a contract will be awarded to one of the ECD contractors for engineering development, advance production engineering, and options for three different production quantities (Figure 2). This is called the engineering development with options phase (ED/O).

The development/advanced production engineering (APE) phase of the ED/O effort provides for delivery and test of pilot vehicles, completion of development and advanced production engineering, and the generation of a technical data package sufficient to support future procurement. At the end of advanced production engineering, the Army retains flexibility of choice in subsequent procurement action. There is the option to buy a production quantity of vehicles from the development/advanced production engineering contractor, complete the procurement, or, if necessary, suspend further action.



Numbers are months.

Figure 2.

Source Selection Structure

The organizational structure for the Scout source selection is conventional except for the Source Selection Evaluation Board. The Source Selection Authority is a high ranking Army officer, designated by the Secretary of the Army. He is responsible for making the final selection decision. He will be supported by a Source Selection Advisory Council consisting of top military and civilian personnel. The Source Selection Advisory Council, in turn, will be supported by the Source Selection Evaluation Board consisting of over 80 experts in important program-related disciplines.

The structure of the Source Selection Evaluation Board for the Scout is a departure from the usual:

- It contains an integrated logistic support (ILS) evaluation element given the same attention as the technical, cost and management groups.
- There is an additional overall review panel responsible for total cost effectivenesss and overall assimilation of the incentive matrix.

Special attention to ILS during the development cycle is expected to ensure that all logistical requirements for Scout are developed concurrently with the overall system. A comprehensive evaluation of the prospective contractors' proposals with regard to ILS is essential. This evaluation will permit the Government to minimize the resources required to operate the system throughout its life cycle, while attaining maximum operational readiness. A special panel conducts the cost effectiveness analysis to evaluate how much performance the Army will get for dollars expended. This complex analysis is most important to the development of a new system where state-of-the-art approaches and tradeoffs compete for recognition and must be resolved.

Another interesting twist planned for the Scout source selection is a "phased method" of evaluation. The evaluation will be conducted in two phases. The first phase will be accomplished by groups of the Source Selection Evaluation Board, including the subsidiary parts of the evaluation organization (factor, subfactor, element). The second phase will be accomplished by the special evaluation panel.

In the first phase, personnel on the Source Selection Evaluation Board will perform the evaluation in two steps. During the first step, they will evaluate their respective areas of responsibility against the proposal evaluation criteria to determine the ratings of each offeror as a potential source, without considering the cost of performance. For this first step, contractor cost proposals will not be provided to the technical, integrated logistic support, or management evaluators, except that man-loadings and labor categories may be provided to evaluators if the group director should request them.

In the second step of this first phase, cost proposals will be provided to the technical, integrated logistic support, and management evaluators to permit them to assess the costs provided by proposers for perform-

Change Your Address?

The Defense Industry Bulletin's mailing list is computer printed. To make changes of address as quickly as possible, we must have your present mailing label. To change your address: fill in your new address at right (company name must be included), clip out this box with your label on the reverse side, and mail it to Defense Industry Bulletin, Defense Supply Agency, Cameron Station, Alexandria, VA. 22314.

Please do not mark or alter the label on the reverse side. Allow two months for change.

Name

Company

Dept., Mail Stop or Code

Street Address

City **State** **ZIP**

Cut Here

Marvin Rich is Chief of the Procurement and Production Division, Armored Reconnaissance Scout Vehicle Project Office, Army Tank-Automotive Command, Warren, Mich. In his position, his primary efforts have been in negotiation and award of contracts for tank and automotive equipment, and he has been instrumental in developing new procurement techniques. Mr. Rich is a graduate of Wayne State University with a B.S. degree in business administration.

ance of the work in order to arrive at a basic government position regarding labor, material, and other direct inputs to performance. This second step of the first phase will serve to validate the comparability of proposals and to identify areas of misunderstandings on the part of offerors. It will also be helpful in establishing the government's position for cost negotiations with the offerors selected for negotiations prior to contract award.

The second phase of the evaluation will be accomplished by the special evaluation panel. This phase will not only include a complete review of the group's efforts, but will also interrelate the various group evaluations into a total proposal evaluation for reporting to the Source Selection Advisory Council.

The Scout Project Manager's Office has carefully examined the vehicle requirements and all facets of the program; solicited and received recommendations from other programs; and reviewed and digested existing government policies related to procurement and source selection. This comprehensive analysis provided the basis for the development of evaluation criteria, an evaluation structure, a specially tailored Source Selection Evaluation Board, operating procedures and instructions, a scoring and weighting plan, a schedule of source selection events, and other supplementary data.

The program is ready to apply the data developed, fairly and equitably, with assurances that "lessons-learned" have been truly learned and applied so that sources may be selected with the greatest potential for success.

Defense Industry Bulletin
Defense Supply Agency
Cameron Station, Alexandria, Va. 22314

Defense Supply Agency
Official Business

UNIVERSITY OF FLORIDA
3 1262 09683 3487

POSTAGE AND FEES PAID
Defense Supply Agency

FLARE

When requesting address change, send this mailing label. Do not alter or deface.

Security Education and Training

(Continued from page 18.)

classified procurement, security inspections, or other functions related to contractor's security responsibilities. So that there is a better awareness of the security risk in industry by government representatives, the school at Fort Holabird offers a variety of courses.

A three-week Basic Industrial Security Orientation Course is scheduled four to six times each year for government representatives whose functions interface with security interests. For example, program, project, systems managers and contracting officers have clearly defined security responsibilities on classification management, approvals of classified visits, conferences and releases, and numerous other areas all bearing on the contractor's security program. In addition to the orientation course, a six-hour seminar on the Industrial Security Requirements for Contracting Officers is offered by each of the 11 Defense Contract Administration Services Regions. Over 6,000 government personnel have taken advantage of this educational offering since it was started in 1966.

A security educational program has been conducted for allied foreign government representatives in the past four years. One week is spent in formal classroom instruction; a second week consists of on-site examination of the Defense Industrial Security Program in contractor facilities, with orientation visits to a Defense Contract Administration Services Region and the Defense Industrial Security Clearance Office (DISCO) at Columbus, Ohio. The third week is devoted to participation in the national conference of the American Society for Industrial Security.

The most meaningful assessment of any effort is in the results obtained. Over 2 million industrial employees of 13,000 contractor facilities are entrusted with classified information vital to our national defense efforts. Tens of thousands of documents and other classified items are handled daily by these trusted many. While even one case of loss or compromise is deplorable, the laws of chance predict they will happen. What is most significant is that the number of security violations which do occur each year is infinitesimal when compared with what could happen. The conclusion is that security education is working well towards its primary objective—safeguarding of classified information entrusted to industry.

Bulletin To Publish Quarterly

Beginning with this issue, the *Defense Industry Bulletin* will be published quarterly. Some of the editorial content formerly carried will be discontinued. As announced in the December 1970 issue, the section on Defense Procurement has been terminated.

☆U. S. GOVERNMENT PRINTING OFFICE : 1970 434-573/6